Next-Generation Distribution System Platform (DSPx) Project Overview

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Room 30E

DSPx Project Overview

Challenge:

What is the appropriate investment strategy for realizing the value of distributed energy resources?

- Encompasses technological, business and policy considerations
- Implications for planning, operations and markets

Origin:

Initiated by CA and NY regulatory commissions (additional participation by DC, MN and HI) to address consistency

Project Objectives:

Phase 1 – *draft materials complete March 2017*

- Inform decision makers on capabilities and related technologies needed over time to meet evolving customer needs and state policy objectives
- Articulate grid capabilities & functions needed to deploy the DSPx to satisfy states' policy objectives
- Develop consistency in terms and definitions
- Identify status & gaps in commercial technology to enable development of DSPx over 5 year period as envisioned in the jurisdictions

Phase 2 – *2017 and beyond*

- Collaborate with regulators, utility industry, and national laboratories to help address barriers and stimulate the development & adoption of technologies needed for advanced distribution planning, grid operations and market operations

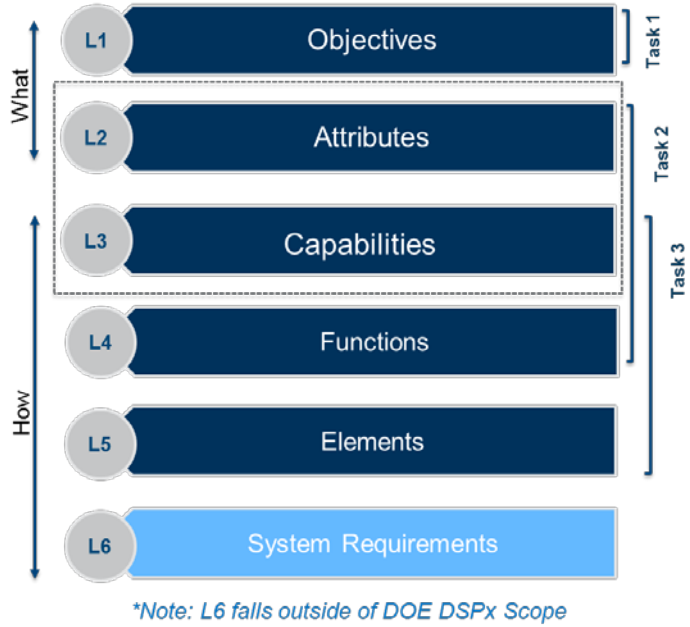
DSPx Phase 1 Deliverables

Volume I DSPx Functional Reference Document (Final 1/31)	• **Defines DSPx functional scope** – **Taxonomic organization of DSPx capabilities, functions and elements mapped to state grid modernization objectives within a planning/operations/market framework** • **Grid architecture context** – **Comparative assessment of industry architectural applications**
Volume II DSPx Market Assessment (Final 2/28)	• **DSPx technology maturity in relation to Vol I functions and elements** – **Assesses availability and gaps in commercial technology needed for DSPx functions and elements; applies technology adoption curves**
Volume III DSPx Decision Maker Guide (Final 2/28)	• **Guide for DSPx implementation** – **Provides considerations for implementing DSPx functionality, including core platform components** – **Deep dives on priority scenarios, e.g., communication network considerations, voltage management with smart inverters, and DER aggregation and optimization**

State Policy Objectives Generally Consistent

Leading to grid properties enabling DER utilization ("Grid as Platform") – though timing, scale and scope are different

Objectives	CA	DC	FL	HI	IL	MA	MN	NC	NY	OR	TX
Affordability	●	●	●	●	●	●	●	●	●	●	●
Reliability	●	●	●	●	●	●	●	●	●	●	●
Customer Enablement	●	●	●	●	●	●	●	●	●	●	●
System Efficiency	●	●	●	●	●	●	●	●	●	●	●
Enable DER Integration	●	●	●	●	●	●	●	●	●	●	●
Adopt Clean Technologies	●	●	●	●	●	●		●	●	●	●
Reduce Carbon Emissions	●	●	●	●				●	●	●	●
Operational Market Animation	●	●		●			●		●		



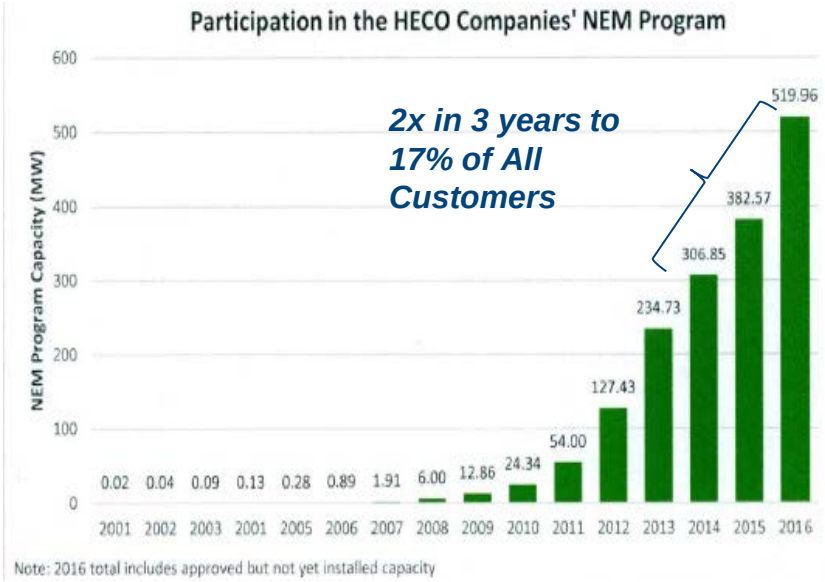
*Note: L6 falls outside of DOE DSPx Scope

DSPx Capabilities

Distribution System Planning	Distribution Grid Operations		Distribution Market Operations
Scalability 3.1.1	Operational Risk Management 3.2.1	Situational Awareness 3.2.2	Distribution Investment Optimization 3.3.1
Impact Resistance and Impact Resiliency 3.1.2	Controllability and Dynamic Stability 3.2.3	Management of DER and Load Stochasticity 3.2.4	Distribution Asset Optimization 3.3.2
Open and Interoperable 3.1.3	Contingency Management 3.2.5	Security 3.2.6	Market Animation 3.3.3
Accommodate Tech Innovation 3.1.4	Public and Workforce Safety 3.2.7	Fail Safe Modes 3.2.8	System Performance 3.3.4
Convergence w/ Other Critical Infrastructures 3.1.5	Attack Resistance/Fault Tolerance/Self-Healing 3.2.9	Reliability and Resiliency Management 3.2.10	Environmental Management 3.3.5
Accommodate New Business Models 3.1.6	Integrated Grid Coordination 3.2.11	Control Federation and Control Disaggregation 3.2.12	Local Optimization 3.3.6
Transparency 3.1.7	Privacy and Confidentiality 3.2.13		

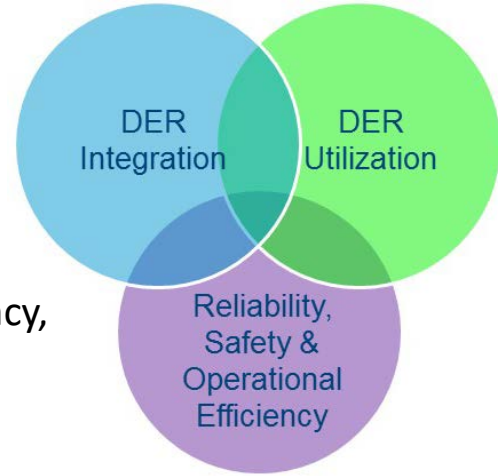
Architectural Based Considerations

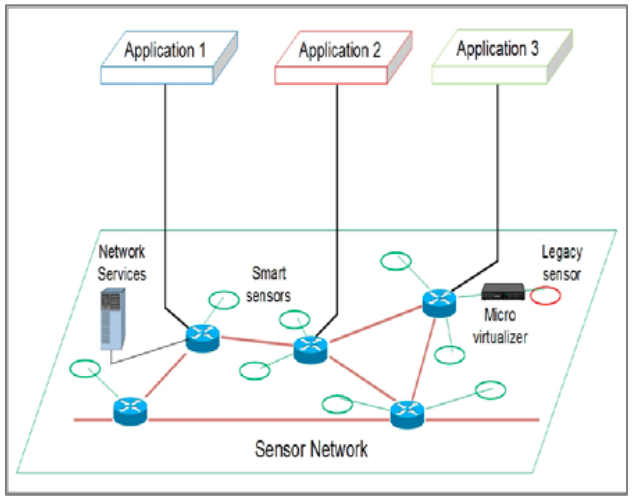
- Define roles and responsibilities to understand how to coordinate all the pieces which enables increasing clarity on subsequent decisions – including what investments are needed and who needs to make them
- Pace & scope of customer needs and policy objectives should drive required investments & conversely timing of investments should align with need
  - This is important to consider in relation to sensing and communications, advanced switches and other field deployed devices with relatively long deployment times



Source: HECO cited in Hawaii PUC Order No. 34281

- Foundational & low regrets investments include enhancements to reliability, safety and operational efficiency, ***and*** enable DER integration & DER utilization

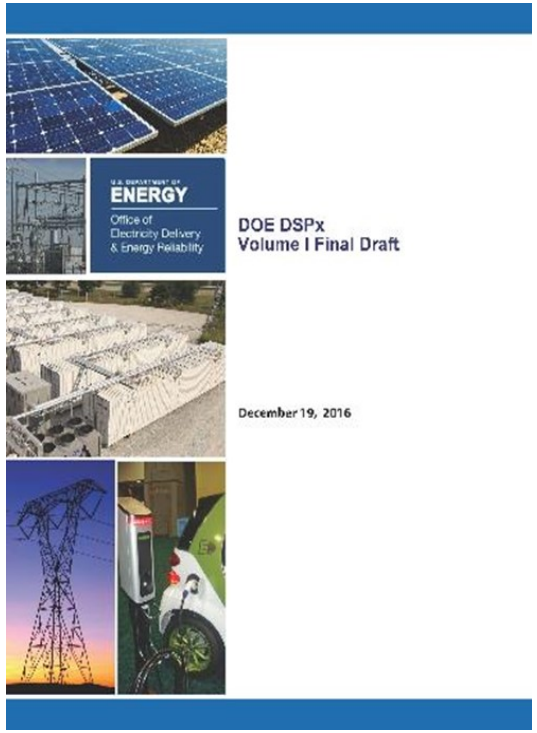




J. Taft and P. De Martini, "Sensing and Measurement Architecture for Grid Modernization," PNNL, Feb. 2016

- Separate infrastructure layers from components: communications in particular should be treated as a foundational infrastructure layer; grid sensing may well be included in this and this combination is a key early investment decision

References



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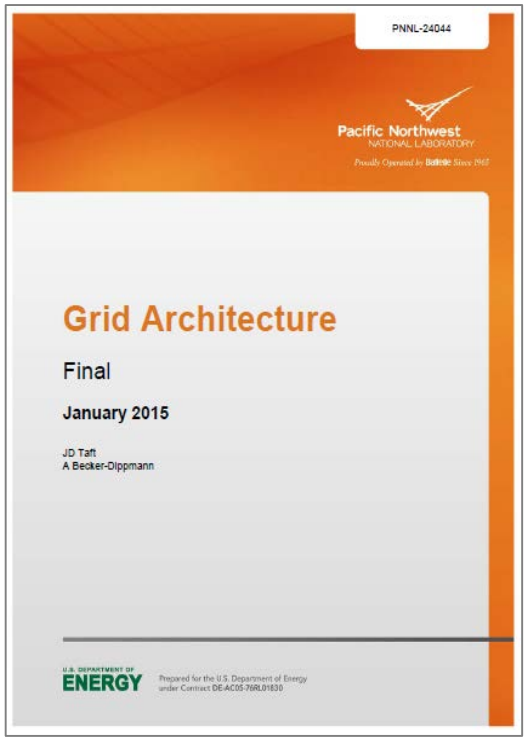

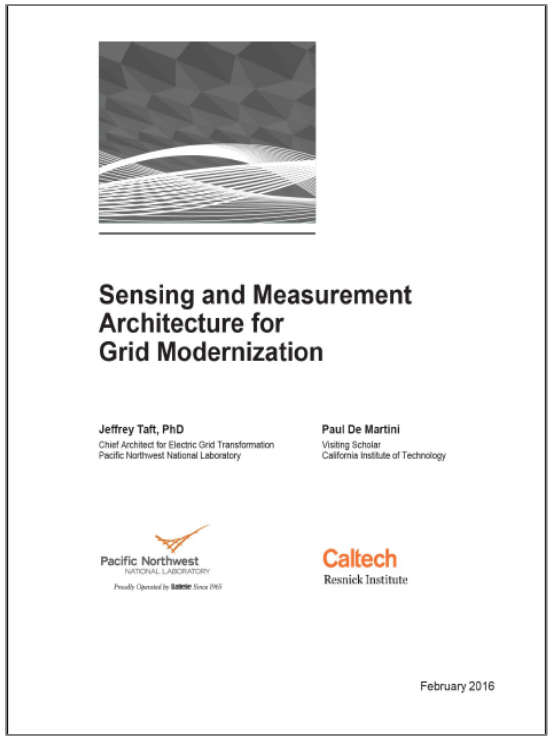

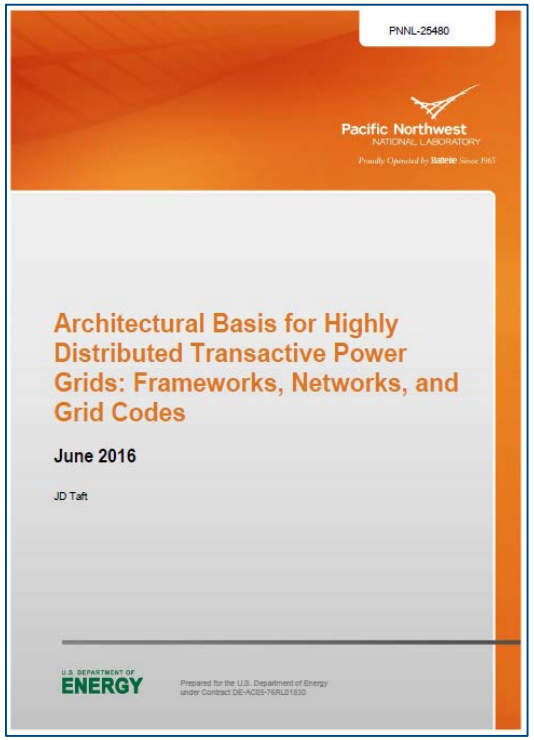

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